PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

04 FEB 2005

Applicant's or agent's file reference A2462PC	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI 2003/000590	International filing date *(day/month/year)* 05.08.2003	Priority date *(day/month/year)* 05.08.2002
International Patent Classification (IPC) or national classification and IPC C10L 1/18		
Applicant Arizona Chemicals et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 4 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☒ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
03.03.2004	15.11.2004
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Form PCT/IPEA/409 (cover sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FI 2003/000590

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-16 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 17A-20A received by this Authority on 04.10.2004
pages* _____ received by this Authority on _____

☐ the drawings:

pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing *(specify)*: _____
- ☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 15,16,27

because:

☐ the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international preliminary examination *(specify)*:

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 15,16,27
are so unclear that no meaningful opinion could be formed *(specify)*:

Claims 15,16 and 27 relate to esters and their use. The esters are characterized by being produced from the fatty acid composition of claim 1. Claims 15 and 16 relate to an extremely large number of possible compounds. Support within the meaning of Article 6/PCT and/or disclosure within the meaning of Article 5 PCT is not to be found for any such compounds. In the present case, the claims lack support, and the application lacks disclosure. Thus, no meaningful opinion is possible for claims 15,16 and 27.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for said claims Nos. _____

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form
- ☐ has not been furnished
- ☐ does not comply with the standard

the computer readable form
- ☐ has not been furnished
- ☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in the Annex C-*bis* of the Administrative Instructions.

☐ See Supplemental Box for further details.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FI 2003/000590

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-14,17-26,28-32	YES
	Claims		NO
Inventive step (IS)	Claims	1-14,17-26,28-32	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-27	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

This opinion is based on the amended claims of 04.10.2004.

The claimed invention relates to a fuel additive consisting of a fatty acid composition having improved low temperature stability and a cloud point below 4 degrees Celsius. The composition is characterized by comprising a high content of unsaturated fatty acids from tall oil and a low content of saturated fatty acids, especially a low content of C18;0, C17;0 and C16;0 and a high content of C18;1, C18;2 and C18;3. It was found that especially C18;3 fatty acids affect the low temperature properties in a beneficial way.

The following documents are considered relevant:

D1: EP 1209215
D2: JAOCS,vol.73.no.12,1996,R.O. Dunn et al, pages 1719-1727.

D1 relates to low-temperature stabilized additives for fuel. It comprises tall oil fatty acid compositions comprising a mixture of saturated and unsaturated fatty acids and a sulphur content of up to 0.05% by weight. The proportion of saturated fatty acids is preferably less than 10% by weight and at least 90% of the constituents consist of unsaturated fatty acids (see page 3, paragraph 0019). A lot of examples of fatty acid compositions are given which have a cloud point of between -27 and -37 degrees Celsius (see page 19, table 2). For example, the composition of the tall oil fatty acid A1 comprises 30% of oleic acid (=C18;1), 60% of linoleic acid (=C18;2) and other polyunsaturated fatty acids and 4% of saturated fatty acids.

.../...

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 15-16 and 27 do not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claims attempt to define the subject-matter in terms of the result to be achieved which merely amounts to a statement of the underlying problem. The claims fail to define the technical feature for which protection is being sought. The ester produced from the fatty acid composition could be any ester produced from the different fatty acids in the composition claimed and would include known esters.

The disclaimer "and said composition lacks a paraffine dispergent" has been introduced in the amended claim 1. This disclaimer is, however, unallowable under Articles 5 and 34(2)(b) for the reason that it adds subject-matter which goes beyond the disclosure of the international application as originally filed. Neither the disclaimer nor the subject-matter excluding it from the scope of the claim have a basis in the application as filed. A disclaimer may be allowable if it restores novelty by delimiting a claim against an accidental anticipation but not if it is relevant for the assessment of inventive step.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

It also comprises a paraffin dispergent which has the function of being a cold stabilizing additive. It has a cloud point of -27 degrees Celsius (see page 19, table 2, ex. V8).

D2 discloses a low-temperature stable fuel additive comprising a soybean oil having an increased concentration methyl esters of unsaturated fatty acids and having a cloud point of -16 degrees Celsius. A small concentration of methyl esters of saturated fatty acids and a high concentration of methyl octadecatrienoate (C18;3) was found to be of importance for the low-temperature properties of the additive (see page 1720, right column and page 1721, left column). Table 1 page 1720 discloses a composition of methyl esters of fatty acids composed of 4.3% C16;0, 1.3% of C18;0, 30.3% of C18;1, 49.6% of C18;1, 11.9% of C18;3 and 2% of methyl esters of other fatty acids.

D1 is considered to represent the closest prior art.

The subject-matter of the claimed invention differ from the fuel additive of D1 in that no paraffin dispergent has been added and the composition is based on purely fatty acids.

The problem to be solved is therefore to prepare a cold-stable fuel additive composition which has a reduced potential interaction with other materials and limited separation.

It is not considered obvious to a person skilled in the art to use the teachings from D1 together with prior-art as specified in D2 in order to achieve a low-temperature stable fuel additive consisting of less than 3% saturated fatty acids, more than 10% C18;3 fatty acids, more than 30% C18;2 fatty acids and less than 35% C18;1 fatty acids.

Accordingly, the composition and process as claimed in claims 1-14, 17-26 and 28-32 are novel are considered to involve an Inventive step and has industrial applicability. The claims are however not allowable because of the disclaimer which has been introduced in the amended claim 1 (see Box VIII).

Claims

1. A fatty acid composition **characterized** in that said composition contains less than 3 % saturated fatty acids, more than 10 % C18;3 fatty acids, more than 30 % C18;2 fatty acids and less than 35 % C18;1 fatty acids, said fatty acids providing improved low temperature stability of the composition, and that the cloud point of said fatty acid composition is lower than –4 °C, and said composition lacks a paraffine dispergent.

2. A fatty acid composition according to claim 1 **characterized** in that said fatty acids are derived from plant sources.

3. A fatty acid composition according to claim 1 or 2 **characterized** in that said fatty acids are derived from tall oil or vegetable sources.

4. A fatty acid composition according to claim 1, 2 or 3 **characterized** in that the composition contains less than 1.5 % saturated fatty acids and more than 90 %, preferably more than 95 %, more preferably more than 98 % unsaturated fatty acids.

5. A fatty acid composition according to claim 4 **characterized** in that the content of the C18;3 fatty acids is more than 15 %, preferably more than 20 %, more preferably more than 25 %.

6. A fatty acid composition according to claim 5 **characterized** in that said C18;3 fatty acid is pinolenic acid.

7. A fatty acid composition according to claim 4 or 5 **characterized** in that the total content of C16;0, C17;0 and C18;0 fatty acids is less than 2.2 %, more preferably less than 1 %, most preferably less than 0.5 %,

8. A fatty acid composition according to claim 4 **characterized** in that the content of C20;0 fatty acids is less than 1 %, preferably less than 0.5 %.

9. A fatty acid composition according to claim 4 **characterized** in that the content of the resin acids is less than 5 %, preferably less than 2 %, more preferably less than 1 %.

10. A fatty acid composition according to claim 4 **characterized** in that the content of the C18;2 fatty acids is more than 40 %, preferably more than 50 %.

11. A fatty acid composition according to claim 4 **characterized** in that the content of the C18;1 fatty acids is less than 25 %, preferably less than 20 %.

12. A fatty acid composition according to any one of the preceding claims **characterized** in that the composition contains more than 10 %, preferably more than 15 % C18;3 fatty acids and more than 30 %, preferably more than 40 % C18;2 fatty acids and less than 1 %, preferably less than 0.5 % C18;0 fatty acids and less than 2 %, preferably less than 1 % resin acids and the total of saturated fatty acids is less than 1.5 %.

13. A fatty acid composition according to any one of the preceding claims having a cloud point factor below 0.28 calculated according to the equation I $Cp_{fac} = A \cdot [C16;0] + B \cdot [C17;0] + C \cdot [C18;0] + D \cdot [C20;0] + E \cdot [C18;1] + F \cdot [C18;2] + G \cdot [C18;3] + H \cdot [Resin]$, wherein [C16;0] means concentration of C16 saturated fatty acids, [C17;0] means concentration of C17 saturated fatty acids, [C18;0] means concentration of C18 saturated fatty acids, [C20;0] means concentration of C20 saturated fatty acids, [C18;1] means concentration of C18 mono-unsaturated fatty acids, [C18;2] means concentration of C18 di-unsaturated fatty acids, [C18;3] means concentration of C18 tri-unsaturated fatty acids, [Resin] means concentration of C16 resin fatty acids and concentration factors are A = 6.2, B = 1.32, C = 34.5, D = 0.075, E = 1.3, F = -0.27, G = -5.1 and H = 17.

14. A fatty acid composition according to any one of the preceding claims **characterized** in that the cloud point of said fatty acid composition is lower than –6 °C, preferably lower than –10 °C, more preferably lower than –15 °C, most preferably lower than –20 °C.

15. An ester **characterized** in that said ester is produced from fatty acid composition according to claim 1.

16. A glycerol ester **characterized** in that said glycerol ester is produced from fatty acid composition according to claim 1.

17. A process for producing a fatty acid composition according to claim 1 **characterized** in that said process comprises the steps of

selecting a crude tall oil having a fatty acid concentration and type capable of providing low temperature stability

distilling said crude tall oil to provide a fatty acid composition containing an effective amount of tall oil fatty acids providing low temperature stability.

18. A process according to claim 17 **characterized** in that selecting includes blending of different crude tall oils.

19. A process according to claim 17 **characterized** in that said crude tall oil is derived from trees grown in a cold climate.

20. A process according to claim 17 **characterized** in that more than 4 % of the fatty acids of the crude tall oil are triple unsaturated fatty acids.

21. A process according to claim 17 **characterized** in that less than 1 % of the fatty acids of the crude tall oil are saturated fatty acids of C18 or greater.

22. A process according to claim 13 **characterized** in that less than 0.3 %, preferably less than 0.2 %, more preferably less than 0.1 % of the fatty acids of the crude tall oil are C18;0 fatty acids.

23. Use of a fatty acid composition according to claim 1 as a fuel additive.

24. Use of a fatty acid composition according to claim 1 as a lubricity improver in fuel.

25. Use according to claim 24 **characterized** in that said lubricity improver forms a part of a fuel additive package containing other additives.

26. Use according to claim 25 **characterized** in that said other additives are one or more of detergent, cold flow additive, antifoam, static dissipate and/or antioxidant.

27. Use of an ester according to claim 15 or 16 as a fuel additive.

28. A fuel additive comprising fatty acid composition according to claim 1 **characterized** in that it is stable at temperature below –4 °C.

29. A fuel containing a fatty acid additive **characterized** in that said fuel contains an effective amount of a low temperature stable fatty acid lubricity enhancer according to claim 1 which is stable at temperature below –4 °C.

30. A fuel according to claim 29 **characterized** in that said fuel is diesel, gas oil, gasoline, aviation fuel or kerosene, or a mixture thereof.

31. A fuel according to claim 29 **characterized** in that sulfur content of said fuel is less than 500 ppm, preferably less than 350 ppm, more preferably less than 50 ppm, more preferably less than 15 ppm, most preferably less than 10 ppm.

32. A fuel according to claim 29 **characterized** in that said fuel contains 10 to 1000 ppm of said fatty acid lubricity enhancer.